



Forging Future Flight: Aeronautics Research at the NASA Langley Research Center (Subsonic Fixed Wing Research)

The NASA Langley Research Center (LaRC)

Located in Hampton, VA, LaRC was established as the nation's first civilian-led aeronautics research laboratory in 1917. NASA Langley serves as a world leader in "cutting edge" aeronautics research. Approximately \$180 million was invested in aeronautics research at LaRC



(2011). In 2010 NASA Langley contributed \$946.8 million to the Virginia economy while supporting 8,624 jobs in the state of Virginia. In the Hampton Roads area in 2010, Langley contributed \$886.7 million to the local economy while supporting 7,962 jobs.

Aeronautics Research Directorate (ARD)

The ARD at NASA LaRC manages projects that support four programs: (1) Integrated System Research Program, (2) Fundamental Aeronautics Program, (3) Aviation Safety Program, and (4) Airspace Systems Program. Research activities are performed under the specific projects described later. The NASA LaRC ARD facilitates external partnerships to complement the agency's aeronautics mission.

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Subsonic Fixed Wing Project (Fundamental Aeronautics Program)

This Glenn Research Center (GRC)-led project integrates work at LaRC, GRC, Ames Research Center (ARC), and Dryden Flight Research Center (DFRC). The work at LaRC includes wind tunnel studies, structural studies, acoustical studies, environmental studies, and tool development.

Primary Goal: Revolutionary energy efficiency for subsonic/transonic transport aircraft with dramatic reductions in harmful emissions and noise to enable sustained growth of air transportation.

Technical Challenges:

- Reduced aircraft noise
- Reduced aircraft emissions
- Reduced aircraft drag
- Reduced aircraft weight
- Improved computational and experimental tools and methods

Recent Research Accomplishments:

Langley researchers assisted in the characterization of biofuel emissions, a process leading to the development of biofuels and certification standards that will enable a more energy-independent future. Research was also

performed concerning the development of lightweight, tailored, unitized metallic structures, and aerodynamic technologies that reduce the drag on advanced airplanes of the next three generations (with focus on the far term N+3 generation).

LaRC Facilities and Capabilities Used in Research:

National Transonic Facility (NTF)
Transonic Dynamics Tunnel (TDT)
14- by 22-Foot Subsonic Tunnel
Basic Aerodynamics Research Tunnel (BART)
Flow Physics Labs
Liner Technology Facility
Quiet Flow Facility
Structural Acoustics Loads & Transmission Facility
Small Anechoic Jet Facility
Acoustics & Dynamics Lab
Mobile Acoustics Facility
12-Foot Low Speed Tunnel
Aerospace Controls Research Lab
Light Alloy Lab
Composite & Polymer Lab



Boeing Concept



MIT Concept

Futuristic N+3 Subsonic Fixed Wing Commercial Transports

National Aeronautics and Space Administration

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For more information about NASA LaRC aeronautics research, visit
<http://aero.larc.nasa.gov/>

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